WHAT IS CLAIMED IS:

1	1. A micromechanical resonator device having a desired mode		
2	shape, the device comprising:		
3	a substrate;		
4	a resonator having a stationary surface area wherein the desired mode		
5	shape is characterized by a plurality of peripheral nodal points located about a		
6	periphery of the resonator and wherein the desired mode shape involves movement		
7	of only a fraction of the stationary surface area at resonance; and		
8	a non-intrusive support structure anchored to the substrate to support		
9	the resonator above the substrate and attached to the resonator at at least one of the		
0	peripheral nodal points to reduce mechanical losses to the substrate.		
1	2. The device as claimed in claim 1, further comprising a drive		
2	electrode structure adjacent the resonator for driving the resonator so that the		
3	resonator changes shape at resonance.		
1	The device as claimed in claim 1, wherein the resonator is an		
2	extensional mode device having a compound mode that involves both radial and		
3	tangential displacement.		
1	4. The device as claimed in claim 3, wherein the resonator is a		
2	disk resonator.		
1	5. The device as claimed in claim 3, wherein the resonator is a		
2	ring resonator.		
1	6. The device as claimed in claim 4, wherein the disk resonator		
2	is a solid disk resonator.		
1	7. The device as claimed in claim 1, wherein the non-invasive		
2	support structure forces the resonator to vibrate in the desired mode shape while		
3	suppressing any undesired mode shapes.		

1	8. The device as claimed in claim 1, wherein the desired mode		
2	shape is a compound mode shape such as a wine-glass mode shape or a triangular		
3	mode shape.		
1	9. The device as claimed in claim 1, further comprising a drive		
2	electrode structure formed on the substrate at a position to allow electrostatic		
3	excitation of the resonator so that the resonator is driven in the desired mode shape		
4	and wherein the resonator and the drive electrode structure define a capacitive gap		
5	therebetween.		
1	10. The device as claimed in claim 9, wherein the drive electrode		
2	structure is disposed about the periphery of the resonator.		
1	11. The device as claimed in claim 9, wherein the capacitive gap		
2	is a sub-micron, lateral, capacitive gap.		
1	12. The device as claimed in claim 9, wherein the drive electrode		
2 structure includes a plurality of split electrodes.			
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1	13. The device as claimed in claim 1, wherein the desired mode		
2	shape is further characterized by a central nodal point which corresponds to a center		
3	of the resonator and wherein the central nodal point and a pair of the peripheral		
4	nodal points are disposed on a nodal axis having substantially no radial displacement		
5	at resonance.		
1	14. The device as claimed in claim 1, wherein the support		
2	structure includes a plurality of anchors positioned about the periphery of the		
3	resonator.		
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1	15. The device as claimed in claim 9, further comprising a sense		
2	electrode structure formed on the substrate at a position to sense output current		
3	based on motion of the resonator.		

1	16.	The device as claimed in claim 15, wherein the drive electrode		
2	structure includes a plurality of separate input drive electrodes and the sense			
3	electrode structure	ncludes a plurality of separate output sense electrodes.		
1	17.	The device as claimed in claim 1, wherein the device is		
2	diamond-based, silicon carbide-based or a composite material having high acoustic			
3	velocity.			
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1	18.	The device as claimed in claim 1, wherein the device is		
2	silicon-based or a composite material having high acoustic velocity.			
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1	19.	The device as claimed in claim 1, wherein the desired mode		
2	r disk mode shape.			
1	20.	The device as claimed in claim 1, wherein the desired mode		
2	shape is a wine-glass ring mode shape.			
1	21.	A method of making a micromechanical device, the device		
2 ·	including a first structure and a non-intrusive support structure attached to the first			
3	structure at at least one anchoring point, the method comprising:			
4	prov	iding a substrate;		
5	forming the first structure on the substrate; and			
6	forming the non-invasive support structure anchored to the substrate			
7	to support the first structure above the substrate wherein the at least one anchoring			
8	point is defined substantially simultaneously with formation of the first structure to			
9	insure that the at least one anchoring point is precisely located relative to the firs			
10	structure.			
1	22.	A method of making a micromechanical resonator device		
2	having a desired m	ode shape, the device including a resonator and a non-intrusive		
3	support structure attached to the resonator at at least one anchoring point whereir			

the desired mode shape is characterized by a plurality of peripheral nodal points 4 5 located about a periphery of the resonator, the method comprising: 6 providing a substrate; 7 forming the resonator on the substrate; and 8 forming the non-invasive support structure anchored to the substrate to support the resonator above the substrate wherein the at least one anchoring point 9 10 is defined substantially simultaneously with formation of the resonator to insure that 11 the at least one anchoring point is precisely located at one of the peripheral nodal 12 points. 1 23. The device as claimed in claim 9, wherein the resonator is a ring resonator having inner and outer peripheries and wherein the drive electrode 2 structure includes inner and outer sets of electrodes disposed about the inner and 3 4 outer peripheries, respectively.